MOSA MACK AND THE CASE OF THE FEUDING TWINS

I'VE BEEN WAITING FOR THIS DAY FOR 25 YEARS. I'M GOING TO MEET MY LONG-LOST TWIN BROTHER.

WE WERE SEPARATED AT BIRTH WHEN OUR PARENTS DIED IN THE BIG ONE.

WAR?

EARTHQUAKE?

FERRIS WHEEL DISASTER.

I'M TERRIFIED.

SO OF COURSE WE'LL LOOK . . .

WE'RE IDENTICAL TWIN BROTHERS.

BUT WE GREW UP IN TWO DIFFERENT PLACES.

IDENTICAL!

COMPLETELY DIFFERENT.

TICK TOCK

LONG LOST IDENTICAL TWINS: TOGETHER AT LAST!

NEWS 12

SO AFTER ALL THESE YEARS, IT MUST BE...

YOU LOOK MORE LIKE A COUSIN THAN A BROTHER.

LIKE I'M LOOKING IN A MIRROR.

REALLY, MO?

SURE, WE WERE **BORN** WITH IDENTICAL GENES. BUT LOTS OF STUFF IS DIFFERENT.

I'VE GOT A PERMA-TAN AND FRECKLES, AND YOU'RE PALE AS A GHOST. YOUR CHEEKS PUFF OUT LIKE A CHIPMUNK, MINE ARE CAVES! YOU'VE GOT TWO FRONT TEETH, MINE ARE THE REAL THING. MY LEFT KNEE GAVE OUT TWICE, MY BACK ACHES AND YOU CAME IN HERE PRACTICALY SKIPPING!

OF COURSE WE AGED DIFFERENTLY. BUT SOME THINGS WE HAVE IN COMMON ARE RATHER AMAZING.

"RATHER AMAZING" I WOULD NEVER SAY THAT!

LOOK AT THE PICTURES OF OUR WIVES. BOTH TALL RED-HEADS NAMED ALICE!

TWILIGHT
TWILIGHT
TWILIGHT
TWILIGHT

AND HAVE READ THE TWILIGHT SAGA OVER 10 TIMES!

OCTOBER

WE BOTH LOVE INSTAGRAM.

GET DEPRESSED IN OCTOBER.

WOW.

SO YOU'RE SAYING WE WERE BORN WITH ALL THAT STUFF? IT WAS JUST OUR GENES, JUST LIKE OUR EYE COLOR?

WELL YES. WE HAVE IDENTICAL GENES. IF YOU KEEP UP WITH SCIENCE, YOU KNOW THAT GENES ARE THE SINGLE MOST IMPORTANT FACTOR THAT DETERMINE HOW YOU LOOK, HOW YOU BEHAVE... WELL, JUST ABOUT EVERYTHING!

I DON'T HAVE TO "KEEP UP WITH SCIENCE" TO SEE THAT WE'RE NOT IDENTICAL, BUSTER.

IT'S JASPER, NOT BUSTER.

I GREW UP IN BEDSACKETT, MASSAACHUSSETS AND YOU GREW UP IN BUCKINGHAM PALACE!

GRIMSLEY PARK, ACTUALLY.

DO THEY NOT HAVE FIGURES OF SPEECH IN ENGLAND?!

DO THEY NOT HAVE INSIDE VOICES IN MASSACHUSETTS?!

FORGET GENETICS! MY ENVIRONMENT MADE ME WHO I AM!

SORRY, NO. IT'S GENETICS!

HOW ABOUT ENDING ON A HAPPY NOTE WITH SOME DESSERT?

CREME BRULEE.

LET GO OF THE ANGER!
TWINS MEET!
I CAN'T CALL THE POLICE ON THE YEAR'S MOST TELEVISED REUNION.
GET HERE QUICK, MOSA!
THE DOCTOR SAYS WE'RE FREE TO GO.
NOTHING IDENTICAL ABOUT US NOW.
Mount Sinai Waiting Room
GROWING UP, YOU DO LOOK IDENTICAL. SAME EYE AND HAIR COLOR. SAME HEIGHT.
ONLY FIVE AND ALREADY LOSING HIS TEETH.
THEY'RE BABY TEETH – EVERYONE LOSES THEM!
THEN THINGS GET INTERESTING!
MY FIRST JOB AS A ROOFER! WE DID 20 HOUSES THAT SUMMER!
SO THAT'S WHERE THE TAN COMES FROM.
BLIMEY! JASPER LOVES HIS SWEETS!
MAYBE THAT'S WHY YOUR TEETH WENT BAD?
LOOKS LIKE YOU DID A LOT OF HEAVY LIFTING. MAYBE OVER THE YEARS, THAT PUT PRESSURE ON YOUR BODY, AND MADE YOUR BACK AND KNEES WEAK.
AND THAT'S WHY I HAVE A WEIGHT PROBLEM. I KNOW, I KNOW!
ALL OF WHICH PROVES MY POINT...

OUR GENES MAY BE EXACTLY THE SAME, BUT IT'S OUR ENVIRONMENT THAT MAKES US WHO WE ARE!

I DON'T KNOW, MO.

SO FAR, SOME THINGS ARE DIFFERENT... BUT A LOT OF STUFF LOOKS THE SAME, TOO!

SO MAYBE IT'S NOT AN EITHER-OR QUESTION.

MEANING: GENETICS AND ENVIRONMENT MAKE US WHO WE ARE?

SAME

- eye color
- hair color
- Alice ♡
- Greyhounds ☹
- October
- Caine Mutt

DIFFERENT

- weight
- knees/hips
- teeth

NOT SO FAST... WHO'S MORE RIGHT?

IS IT GENES...

OR THE ENVIRONMENT YOU GREW UP IN...

WHICH WOULD MAKE YOU BOTH RIGHT!

...THAT MAKES YOU WHO YOU ARE?

IF THERE'S ANYPLACE TO FIND THE ANSWER TO THAT QUESTION, IT'S RIGHT HERE. THIS HOSPITAL HAPPENS TO HAVE ONE OF THE BEST GENETIC RESEARCH LABS IN THE WORLD!

IT'S YOUR GENES!

IT'S YOUR ENVIRONMENT!

BEFORE WE TALK ABOUT TWINS, LET'S REVIEW WHAT WE KNOW ABOUT THE GENE.

AS WE LEARNED FROM THE FROGS AND ALGAE, GENES COME FROM OUT PARENTS.

AND A GENE IS A SECTION OF OUR DNA – THAT'S SORT OF A CODE FOR A SPECIFIC TRAIT.

Cleft chin

Blonde hair

Freckles

VERY GOOD. FOR EXAMPLE, WE HAVE A SEPCIFIC GENE THAT'S CODED FOR A DIMPLED CHIN OR A WIDOW'S PEAK. AND THERE'S A SPECIFIC GENE THAT'S CODED FOR CERTAIN DISEASES, LIKE SICKLE CELL.

Gene

Dimpled chin

SO... ONE GENE TO ONE TRAIT? THAT'S EASY.

YES... BUT MOST TRAITS DEPEND ON LOTS OF OTHER STUFF BESIDES JUST ONE GENE.

SUCH AS?

Freckles

Gene

Brown eyes

Dimples

Gene

Blonde hair

Gene

Freckles

Gene

Brown eyes

Gene

Dimples

Blonde hair

Gene

Red hair

THE EFFECTS OF OTHER GENES. FOR INSTANCE, HEIGHT DEPENDS ON THE EFFECT OF HUNDREDS OF DIFFERENT GENES.

AND BECAUSE SO MANY GENES GO INTO A SINGLE TRAIT, THE WAY THEY WORK TOGETHER IS SOMETIMES DIFFERENT. WHICH MEANS THE TRAIT MIGHT COME OUT DIFFERENT, FROM ONE PERSON TO ANOTHER.

OTHER THINGS AFFECT THE WAY GENES WORK, TOO

EXPOSURE TO SUNLIGHT AND LEVELS OF EXERCISE. THAT'S WHAT WE CALL ENVIRONMENT.

ENVIRONMENT. DOES THAT ALSO MEAN. . . WHAT WE EAT?

Eviction

YES. DIET AND NUTRITION. STRESS. EXPOSURE TO TOXINS – ALL OF THOSE AFFECT WHICH GENES ARE TURNED ON OR OFF AS LIFE GOES ON.

ON

OFF

FOR EXAMPLE, EVEN IF YOU HAVE THE GENES FOR A CERTAIN TYPE OF CANCER.

HEALTHY EATING AND EXERCISE CAN HELP PREVENT THAT TRAIT FROM APPEARING!

GENETICS AND ENVIRONMENT: TOGETHER!

UM. FELLAS? CAN WE GET BACK TO ME AND MY BROTHER NOW?

RIGHT. OKAY.

LIKE ALL IDENTICAL TWINS, YOU WERE BORN WITH EXACTLY THE SAME GENES. . .

BUT REMEMBER: WHAT GENES WE HAVE IS ONLY ONE PART OF WHAT MAKES US WHO WE ARE.

THE OTHER PART IS: WHAT OUR GENES DO. HOW THEY ACT WITH OTHER GENES. WHETHER THEY TURN ON OR OFF.

SO AS SOON AS MO AND JASPER WERE BORN, ENVIRONMENT STARTED TO MAKE THEM DIFFERENT.

AND OVER TIME, THEY'RE LESS AND LESS LIKE EACH OTHER...

AND MORE AND MORE LIKE... WHO THEY ARE NOW!

FINE WORK, CHUMS. BUT YOU SEE, OUR QUESTION IS –

OF THE TWO, WHICH IS MORE IMPORTANT? THE ENVIRONMENT YOU GREW UP IN?

OR THE GENES YOU'RE BORN WITH?

WHY DOES EVERYBODY ALWAYS ASK THE SAME QUESTION?

LIBRARY OF TWIN STUDIES

IN ALL OF THESE STUDIES, SCIENTISTS LOOK AT IDENTICAL TWINS, RAISED APART, JUST LIKE YOU. AND COMPARE THEM TO TWINS OR SIBLINGS WITH DIFFERENT GENETIC MATERIAL, RAISED TOGETHER.

WELCOME TO OUR LIBRARY OF TWIN STUDIES.

THE MORE A TRAIT IS SHARED BY TWINS. . .THE MORE IT'S BECAUSE OF GENETICS.

AND THE LESS IT'S SHARED. . .THE MORE IT'S BECAUSE OF ENVIRONMENT?

IT'S THE LIBRARY-SIZED VERSION OF YOUR NOTEBOOK, MOSA

"TROUBLE READING" - THAT'S MORE GENETIC?!

FROM BROAD STUFF. . .

INTELLIGENCE

MUSICAL ABILITY

ABILITY TO HOLD A JOB

BEING BORN WITHOUT AN ORGAN

TO REALLY SPECIFIC.

WHICH IS WHY YOU READ THE TWILIGHT SAGA 10 TIMES, TOO?

READING TROUBLE

I'M ALWAYS EMBARRASSED TO TELL PEOPLE.

THE FIRST FEW READS TOOK FOREVER - I WAS TRYING TO GET THE WORDS. THEN I COULD ENJOY THE STORY!

YOU'RE SQUEEZING MY NECK.

CHECK THIS OUT: A STUDY ON HUMOR! WITH CARTOONS!

The Far Side by Gary Larson

CAR!

I'M GONNA SAY YOUR SENSE OF HUMOR IS DETERMINED BY YOUR ENVIRONMENT?

PERHAPS. BUT WHAT ABOUT...

RESISTANCE TO STRESS, CAUTION: MORE STRONGLY DETERMINED BY ENVIRONMENT!

LEADERSHIP AND AMBITION: MORE STRONGLY DETERMINED BY GENETICS!

PERSONALITY

WHAT ABOUT, SAY... STUBBORNESS?

ALWAYS THINKING YOU'RE RIGHT?

SECURITY!

GENETICS!
ENVIRONMENT!
HOSPITAL
TAXI
YOU'RE LOOKING AT IT THE WRONG WAY, TWINS!
I HOPE SOMEDAY YOU CAN SEE THAT.
THIS SHOW WILL NOT END SAD! THIS SHOW WILL NOT END SAD!
SORRY, OPRAH! WE TRIED!
TAKE ME TO THE BUS STATION!
TAKE ME TO THE AIRPORT!
GENETICS INFLUENCED SOME TRAITS... BUT SO DID ENVIRONMENT!
UH-OH.
PROBABLY THE SPARK PLUGS. THEY'RE ALWAYS THE FIRST THING TO GO.
I'M GUESSING WE'RE JUST OUT OF GAS. IF THE ENGINE ISN'T RUNNING, IT USUALLY MEANS: NO FUEL.
AN ENGINE NEEDS A SPARK!
AN ENGINE NEEDS FUEL!
ACTUALLY, TWINS_

AN ENGINE NEEDS SPARK AND FUEL, WORKING TOGETHER.

THAT'S IT!

THAT'S WHAT?

THAT'S WHAT THE SCIENTISTS MEANT! THE ANSWER IS NOT GENETICS OR ENVIRONMENT.

AND IT'S NOT GENETICS MORE THAN ENVIRONMENT, OR ENVIRONMENT MORE THAN GENETICS.

THEN WHAT IS IT?

WE ARE WHO WE ARE BECAUSE OF...

WHAT MAKES US WHO WE ARE?